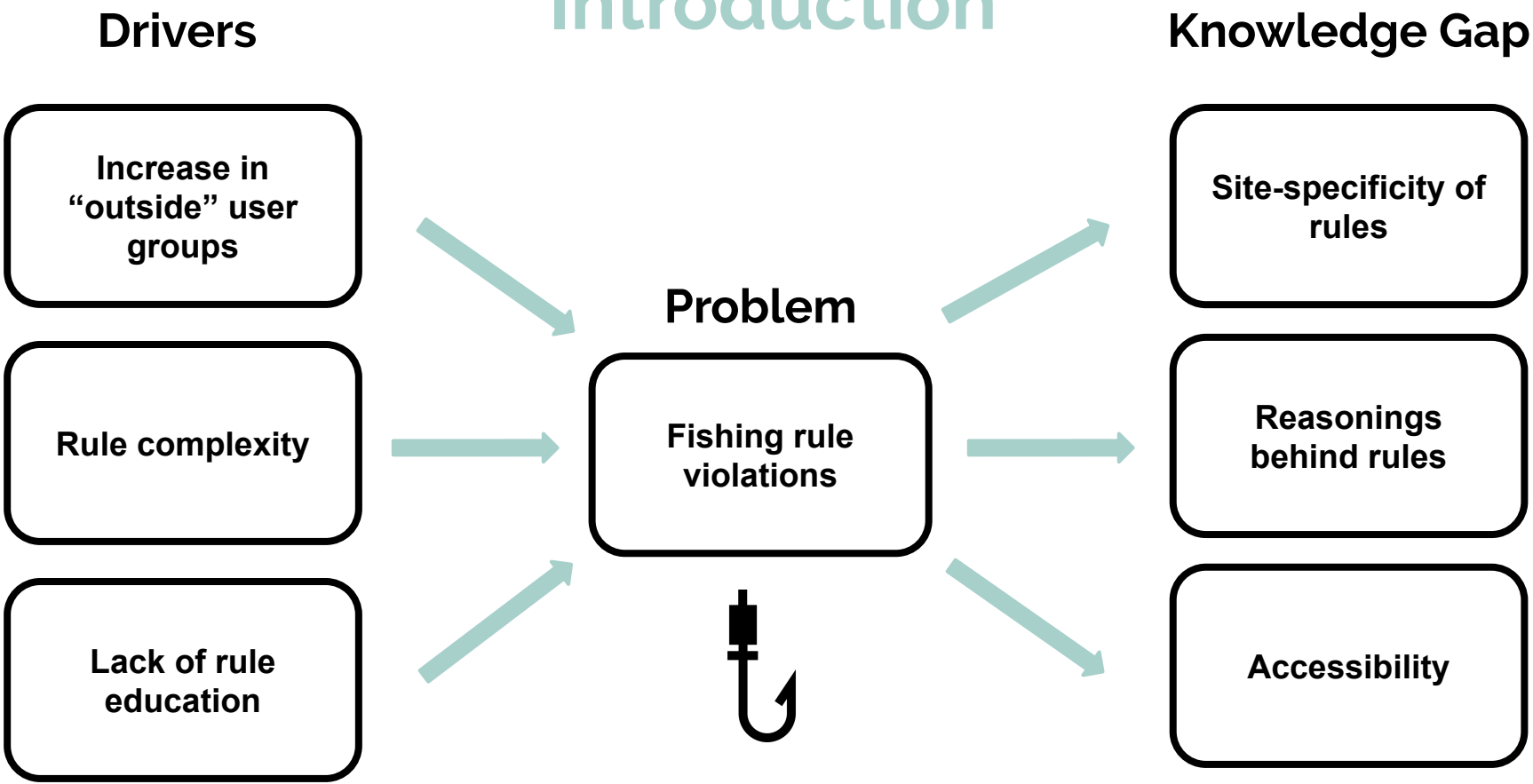
Improving the Communication of Fishing Rules and Regulations in Maunalua Bay, Oʻahu

Hi’ilei Casco, Samantha Alvarado, Siena Schaar

Introduction



Research Questions

1. How can we improve the **communication and accessibility** of Hawai‘i fishing rules and regulations to the stakeholders of Maunalua Bay?

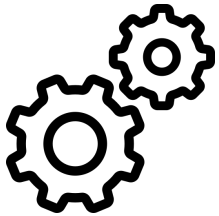
2. What are the **top 15 significant, fished species** in Maunalua Bay?

3. What are the **most relevant** Hawai‘i fishing rules and regulations to Maunalua Bay?

Objective

Develop multi-generational, site-specific educational materials for Maunalua Bay fishers and users

Our Process



Survey + Literature Review

- Cross reference survey responses
- Fish ecology, biology, and management
- Social science and communication research

Draft Deliverables

- Utilize environmental literacy, communication, and social marketing strategies

Feedback

- Send draft deliverables to clients for comment + feedback

Final Prototypes

- Address edits + feedback
- Polish design and content
- Print and distribute to clients

Project Deliverables

Audience	Deliverable
Youth (ages 0 - 8)	ʻO Wai Kēia Iʻa? - Children's book
Inexperienced fishers	Lawaiʻa-in-Training Handbook
Experienced fishers	Experienced Fisher Handbook
All audiences	Maunalua Bay Rules + Regulations Pono Fishing Calendar

Unique Features

Site-specific

- Top 15 “significant” fished species
  - NGO survey
  - NOAA Fisher Effort Study
  - Literature Review
- Most relevant fishing practices

Multi-generational

- Addresses youth to adult audiences
- Interactive

Educational

- Translated scientific reasonings and jargon
- Best practices

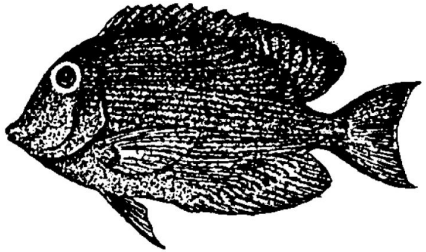
Design

- Streamlined
- Limited or defined jargon

‘O Wai Kēia I‘a? Children’s Book

‘O wai kēia i‘a?
What is this fish?

He **Kole** kēia.
This is a Kole.



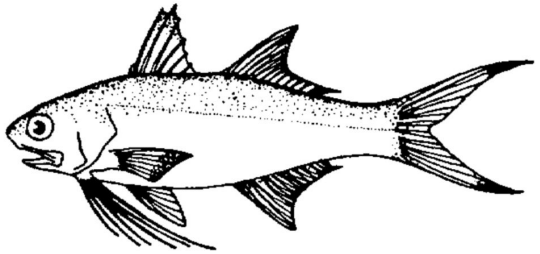
Goldring Surgeonfish
Ctenochaetus strigosus

He i‘a ‘ele‘ele kēia. He maka melemele kō kole. Ho‘oono kēia i‘a.
This is a black fish. Kole has a yellow eye. Kole is good to eat.

Developed by Casco, H., Schaar, S., and Alvarado, S. 2019.

‘O wai kēia i‘a?
What is this fish?

He **Moi** kēia.
This is a Moi.



Six-fingered Threadfin
Polydactylus sexfilis

Ua ‘ai ia na ali‘i i na moi. Ono kēia i‘a. ‘O na wahine na moi nui.
Moi was eaten by ali‘i. This fish is delicious. The large moi are female.

Developed by Casco, H., Schaar, S., and Alvarado, S. 2019.

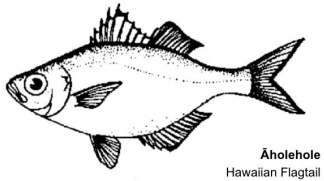
- Bilingual (Hawaiian and English)
- Highlights Hawaiian cultural importance of fish
- Teaches about life stages of fish and their Hawaiian names

Pono Fishing Calendar

Developed by Casco, H., Schaar, S., and Alvarado, S. 2019.

February

- **Āholehole** males mature. Peak spawning begins in February and lasts several months.
- **Kumu** peak spawning begins in February and lasts several months.
- **Manini** peak spawning begins in February and lasts several months (Feb - June).



Āholehole
Hawaiian Flagtail
Kuhlia xenura

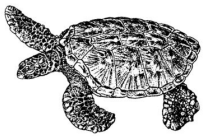
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

Developed by Casco, H., Schaar, S., and Alvarado, S. 2019.

May

- **Honu** nesting primarily takes place in May through August.
- **ʻŌmilu** peak spawning begins in May and lasts till August.

Safe Fishing Practices for Sea Turtles
As a preventative measure to ensure that turtles are not accidentally caught - do not cast line in areas that turtles have been spotted surfacing for air. Areas where turtles are spotted surfacing, increases the chances of accidental capture.

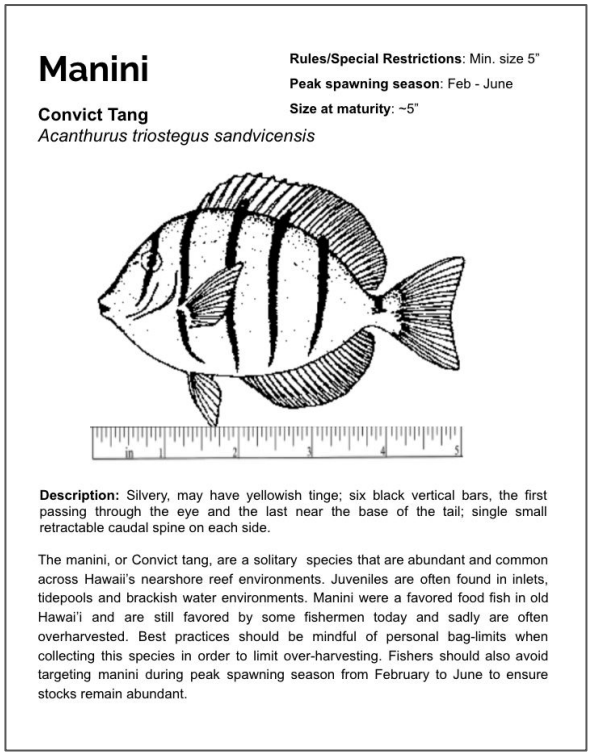


Honu
Sea Turtle
Chelonia mydas, Eretmochelys imbricata

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

- Both 2019 calendar and blank template (for future modifications)
- Emphasizes spawning seasons for specific species
- Provides pono fishing practices for other species in Maunalua Bay (e.g. turtles, limu)

Lawai‘a-in-Training Handbook



Manini

Rules/Special Restrictions: Min. size 5”

Peak spawning season: Feb - June

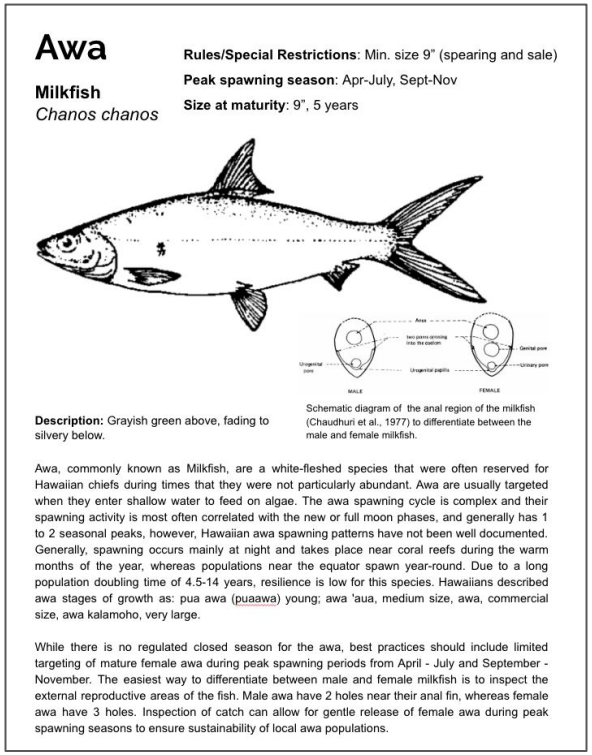
Size at maturity: ~5”

Convict Tang

Acanthurus triostegus sandvicensis

Description: Silvery, may have yellowish tinge; six black vertical bars, the first passing through the eye and the last near the base of the tail; single small retractable caudal spine on each side.

The manini, or Convict tang, are a solitary species that are abundant and common across Hawaii’s nearshore reef environments. Juveniles are often found in inlets, tidepools and brackish water environments. Manini were a favored food fish in old Hawai’i and are still favored by some fishermen today and sadly are often overharvested. Best practices should be mindful of personal bag-limits when collecting this species in order to limit over-harvesting. Fishers should also avoid targeting manini during peak spawning season from February to June to ensure stocks remain abundant.



Awa

Rules/Special Restrictions: Min. size 9” (spearing and sale)

Peak spawning season: Apr-July, Sept-Nov

Size at maturity: 9”, 5 years

Milkfish

Chanos chanos

Schematic diagram of the anal region of the milkfish (Chaudhuri et al., 1977) to differentiate between the male and female milkfish.

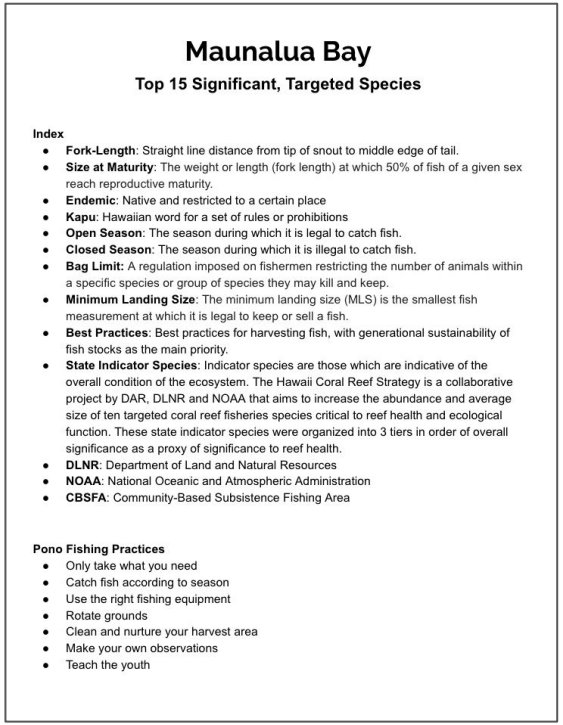
Description: Grayish green above, fading to silvery below.

Awa, commonly known as Milkfish, are a white-fleshed species that were often reserved for Hawaiian chiefs during times that they were not particularly abundant. Awa are usually targeted when they enter shallow water to feed on algae. The awa spawning cycle is complex and their spawning activity is most often correlated with the new or full moon phases, and generally has 1 to 2 seasonal peaks, however, Hawaiian awa spawning patterns have not been well documented. Generally, spawning occurs mainly at night and takes place near coral reefs during the warm months of the year, whereas populations near the equator spawn year-round. Due to a long population doubling time of 4.5-14 years, resilience is low for this species. Hawaiians described awa stages of growth as: pua awa (puaawa) young; awa ‘aua, medium size, awa, commercial size, awa kalamoho, very large.

While there is no regulated closed season for the awa, best practices should include limited targeting of mature female awa during peak spawning periods from April - July and September - November. The easiest way to differentiate between male and female milkfish is to inspect the external reproductive areas of the fish. Male awa have 2 holes near their anal fin, whereas female awa have 3 holes. Inspection of catch can allow for gentle release of female awa during peak spawning seasons to ensure sustainability of local awa populations.

- Discusses fish spawning and maturity info > key for reasonings behind rules and regulations
- Highlights important behavioral information
- Shares best practices based off of fish ecology

Experienced Fishers Handbook



Maunalua Bay

Top 15 Significant, Targeted Species

Index

- **Fork-Length**: Straight line distance from tip of snout to middle edge of tail.
- **Size at Maturity**: The weight or length (fork length) at which 50% of fish of a given sex reach reproductive maturity.
- **Endemic**: Native and restricted to a certain place
- **Kapu**: Hawaiian word for a set of rules or prohibitions
- **Open Season**: The season during which it is legal to catch fish.
- **Closed Season**: The season during which it is illegal to catch fish.
- **Bag Limit:** A regulation imposed on fishermen restricting the number of animals within a specific species or group of species they may kill and keep.
- **Minimum Landing Size**: The minimum landing size (MLS) is the smallest fish measurement at which it is legal to keep or sell a fish.
- **Best Practices**: Best practices for harvesting fish, with generational sustainability of fish stocks as the main priority.
- **State Indicator Species**: Indicator species are those which are indicative of the overall condition of the ecosystem. The Hawaii Coral Reef Strategy is a collaborative project by DAR, DLNR and NOAA that aims to increase the abundance and average size of ten targeted coral reef fisheries species critical to reef health and ecological function. These state indicator species were organized into 3 tiers in order of overall significance as a proxy of significance to reef health.
- **DLNR**: Department of Land and Natural Resources
- **NOAA**: National Oceanic and Atmospheric Administration
- **CBSFA**: Community-Based Subsistence Fishing Area

Pono Fishing Practices

- Only take what you need
- Catch fish according to season
- Use the right fishing equipment
- Rotate grounds
- Clean and nurture your harvest area
- Make your own observations
- Teach the youth

Awa

Milkfish
Chanos chanos

Rules/Special Restrictions: Min. size 9" (spearing and sale)
Peak spawning season: Apr-July, Sept-Nov
Size at maturity: 9", 5 years

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ʻAmaʻama

Striped Mullet
Mugil cephalus

Rules/Special Restrictions: Season closed: Dec-March, Min. size 11"
Peak spawning season: Dec-March
Size at Maturity: ~11" or about 1 year old

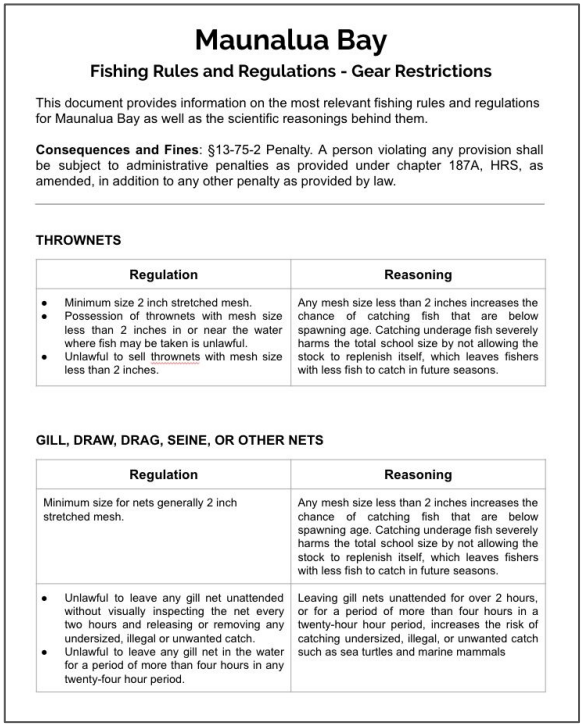
The ʻAmaʻama or striped mullet is and was one of the most important freshwater, or brackish water, fish of the Hawaiians. Early Hawaiians caught the spawn in nets along the coast, and grew them in ponds to always have a constant and sustainable supply. Hawaiians named the life stages of the 'ama'ama based on length : finger length, pua 'ama'ama; hand-length, kahaka; about 8 inches, 'ama'ama; 12 inches or more; 'anae. Observations made by early Hawaiians found that the 'anae made seasonal migrations around part of the island of O'ahu. When migrating they are called 'anae holo (running or travelling mullet); when they remain more or less offshore, or have returned from the journey, they are called 'anae pali (cliff mullet).

Maunalua Bay has many estuarine areas where ʻAmaʻama are present and are targeted by fishers.The state imposed closed season for ʻAmaʻama aligns with their observed peak spawning season from December to March and is designed to help the species reproduce sustainably with less fishing pressure, essentially protecting the species from overharvest during critical spawning periods. Minimum size is roughly identical to size at reproductive maturity.

- Intended for experienced fish audiences (no descriptions or pictures)
- Highlights reasonings behind rules and regs (i.e. spawning, size at maturity)
- Also encourages best practices

Maunalua Bay Rules + Regs

- Provides scientific reasonings for each relevant rule and reg
- Provides categories for varying types of rules and regs
- Clearly explains value and purpose for each rule and reg



Maunalua Bay

Fishing Rules and Regulations - Gear Restrictions

This document provides information on the most relevant fishing rules and regulations for Maunalua Bay as well as the scientific reasonings behind them.

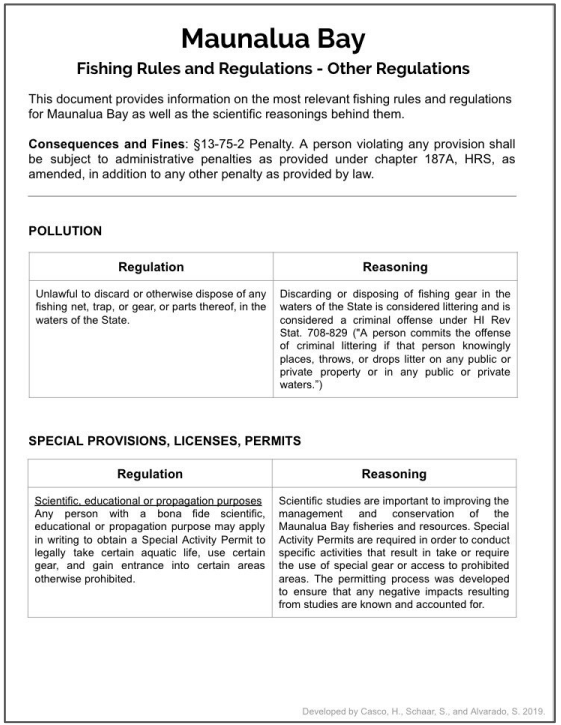
Consequences and Fines: §13-75-2 Penalty. A person violating any provision shall be subject to administrative penalties as provided under chapter 187A, HRS, as amended, in addition to any other penalty as provided by law.

THROWNETS

Regulation	Reasoning
• Minimum size 2 inch stretched mesh. • Possession of throwets with mesh size less than 2 inches in or near the water where fish may be taken is unlawful. • Unlawful to sell throwets with mesh size less than 2 inches.	Any mesh size less than 2 inches increases the chance of catching fish that are below spawning age. Catching underage fish severely harms the total school size by not allowing the stock to replenish itself, which leaves fishers with less fish to catch in future seasons.

GILL, DRAW, DRAG, SEINE, OR OTHER NETS

Regulation	Reasoning
Minimum size for nets generally 2 inch stretched mesh.	Any mesh size less than 2 inches increases the chance of catching fish that are below spawning age. Catching underage fish severely harms the total school size by not allowing the stock to replenish itself, which leaves fishers with less fish to catch in future seasons.
• Unlawful to leave any gill net unattended without visually inspecting the net every two hours and releasing or removing any undersized, illegal or unwanted catch. • Unlawful to leave any gill net in the water for a period of more than four hours in any twenty-four hour period.	Leaving gill nets unattended for over 2 hours, or for a period of more than four hours in a twenty-hour hour period, increases the risk of catching undersized, illegal, or unwanted catch such as sea turtles and marine mammals



Maunalua Bay

Fishing Rules and Regulations - Other Regulations

This document provides information on the most relevant fishing rules and regulations for Maunalua Bay as well as the scientific reasonings behind them.

Consequences and Fines: §13-75-2 Penalty. A person violating any provision shall be subject to administrative penalties as provided under chapter 187A, HRS, as amended, in addition to any other penalty as provided by law.

POLLUTION

Regulation	Reasoning
Unlawful to discard or otherwise dispose of any fishing net, trap, or gear, or parts thereof, in the waters of the State.	Discarding or disposing of fishing gear in the waters of the State is considered littering and is considered a criminal offense under HI Rev Stat. 708-829 ("A person commits the offense of criminal littering if that person knowingly places, throws, or drops litter on any public or private property or in any public or private waters.")

SPECIAL PROVISIONS, LICENSES, PERMITS

Regulation	Reasoning
Scientific, educational or propagation purposes Any person with a bona fide scientific, educational or propagation purpose may apply in writing to obtain a Special Activity Permit to legally take certain aquatic life, use certain gear, and gain entrance into certain areas otherwise prohibited.	Scientific studies are important to improving the management and conservation of the Maunalua Bay fisheries and resources. Special Activity Permits are required in order to conduct specific activities that result in take or require the use of special gear or access to prohibited areas. The permitting process was developed to ensure that any negative impacts resulting from studies are known and accounted for.

Developed by Casco, H., Schaar, S., and Alvarado, S. 2019.

Key Learnings

Fisheries Science

- Regulation size ≠ size at maturity
- Reasonings difficult to find
- Rules and regs can be improved

Social Science

- Framing of audience (violators vs. learners)
- Language of rules + regs

Teamwork + Collaboration

- Partnership with stakeholders
- Roles and responsibilities

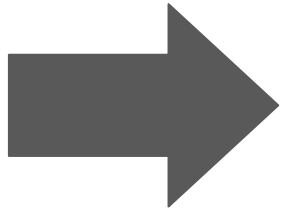
Defining Parameters

- Defining “most significant” by stakeholder groups
- Interdisciplinary

Regulation Size ≠ Size at Maturity

Species	Minimum Catch Size (regulation)	Size at Maturity
ʻOpelu Mackerel Scad *Decapterus macarellus*	None	9.6”
ʻŌmilu Ulua and Pāpio, Bluefin Trevally *Caranx melampygus*	10” Sale size 16”	12-16”
Heʻe Mauli Day octopus *Octopus cyanea*	1 lb	2.6 lbs

Next Steps

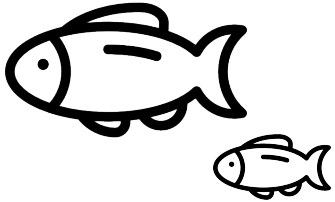


Material Translations

- Languages of other cultural groups

Distribution

- Looking at other methods of distribution
  - Website
  - Other types of deliverables



Mahalo!

Any questions?

Hi’ilei Casco, Samantha Alvarado, Siena Schaar